Amendments to the Specification:

Please amend the paragraph at page 3, line 24 to page 4 line 8 as follows:

The reading apparatus of the evanescent system is constituted such that, when ~~excited~~ exciting light is irradiated from a lateral side of a DNA micro array substrate, evanescent light having exuded slightly on the surface of the substrate excites a fluorescent substance applied to complementarily bonded DNA to cause the fluorescent substance to emit light, and the emitted light is received by a photodiode, thereby allowing the photodiode to determine the position of the complementary DNA probe.

Please amend the paragraph at page 7, lines 17 to 24 as follows:

Alternatively, the optical DNA sensor according to the present invention comprises:

a solid imaging device,

an ~~excited~~ exciting light absorbing layer formed on the surface of the solid imaging device, and

~~A~~ a plurality of types of DNA probe-which include nucleotide sequence and are aligned and fixed on the ~~excited~~ exciting light absorbing layer.

Please amend the paragraph at page 11, lines 7 to 17 as follows:

FIG. 13A is a view showing wavelength dependence of photosensitivity of amorphous silicon, FIG. 13B is a logarithmic graph showing a relation between a thickness of an ~~excited~~ exciting light absorbing layer 34 formed on the surface of the solid imaging device and a transmittance of phosphor exciting light and fluorescence, and FIG. 13C is a logarithmic graph showing a relation between a thickness of the ~~excited~~ exciting light absorbing layer 34 when a charge density of ITO is further controlled and a transmittance of phosphor exciting light and fluorescence;

Please amend the paragraph at page 47, line 25, to page 48, line 7, as follows:

As shown in FIG. 11, the optical DNA sensor according to the third embodiment is structured by additionally including an ~~excited~~ exciting light absorbing layer 34 to the optical DNA sensor according to either of the above-described embodiments. FIG. 11 is a cross-section of the optical DNA sensor of the third embodiment which is similar to the sensor of the first embodiment shown in FIG. 3.

Please amend the paragraph at page 48, lines 8 to 15 as follows:

The optical DNA sensor 1 of this embodiment includes a solid imaging device 2, an ~~excited~~ exciting light absorbing layer 34 formed on the surface of the solid imaging device and made from a titanium oxide layer with a fixed thickness, and spots 60, 60, . . . arrayed and fixed on the ~~excited~~ exciting light absorbing layer 34, wherein each of the spots 60 corresponds to each of pixels of the solid imaging device.

Please amend the paragraph at page 50, line 18, to page 51, line 2, as follows:

On the surface of the solid imaging device 2, a protective insulated film 31, an ~~excited~~ exciting light absorbing layer 34, a conductive layer and an overcoat layer are laminated in this order. The protective insulated film 31 coats all the sensors 20, 20, . . . in the block, and is formed over the top gate electrode 30 and the top gate lines 44, 44, . . . so as to coat them. The protective insulated layer 31 has insulating and light-transmitting properties and is made from silicon nitride or silicon oxide.

Please amend the paragraph at page 51, lines 3 to 11 as follows:

Over the protective insulated layer 31, the ~~excited~~ exciting light absorbing layer 34 is formed so as to coat all the sensors 20, 20, . . . Titanium oxide contained in the ~~excited~~ exciting light absorbing layer 34 is classified into the anatase-type and the rutile-type. Although both types can be used in the present invention, it is preferable to use the rutile-type. The crystalline structure of the rutile-type titanium oxide is tetragonal, and the arrangement of Ti is body-centered cubic structure.

Please amend the paragraph at page 51, lines 12 to 20 as follows:

The ~~excited~~ exciting light absorbing layer 34 has a property to absorb a phosphor exciting light (mainly an ultraviolet ray particularly in a zone of around the central wavelength of 308 nm) that excites a fluorescent substance used for a DNA identification method described later and to transmit fluorescence emitted from the fluorescent substance excited by the phosphor exciting light (mainly visible light particularly in a zone of around the central wavelength of 520 nm).

Please amend the paragraph at page 52, line 18 to page 53, line 4, as follows:

The ~~excited~~ exciting light absorbing layer 34 of the rutile-type crystal is cubic, and, considering the configuration of a titanium atom, it has a body-centered cubic structure. This crystal is a uniaxial crystal of which optical axis exists in C axis. Although the complex index of refraction N accurately differs depending on an angle between an electric field vector of an incident light and the C axis, the extinction coefficient k of a ultraviolet ray of 300 nm more or less is 2 in average, and the extinction coefficient k of a visible ray of 440 nm more or less comes to 0.06. In case of a visible ray of 460 nm, the extinction coefficient k can be assumed as k=0.

Please amend the paragraph at page 53, lines 5 to 18 as follows:

In FIG. 13B, a relation between the thickness of the ~~excited~~ exciting light absorbing layer 34 and transmittances of the phosphor exciting light with a wavelength of 308 nm and fluorescence with a wavelength of 530 nm is shown in a logarithmic graph. As shown in FIG. 13B, as the thickness of the ~~excited~~ exciting light absorbing layer 34 increases, the

transmittance of the phosphor exciting light is lowered. When the thickness of the ~~excited~~ exciting light absorbing layer 34 is 100 nm or greater, the transmittance of the phosphor exciting light becomes 1.0.times.10.sup.-3 or less. On the other hand, the transmittance of the fluorescence is not low as much as that of the phosphor exciting light and is 50% or more irrespective of the thickness of the ~~excited~~ exciting light absorbing layer 34.

Please amend the paragraph at page 53, line 19 to page 54, line 10 as follows:

As shown in FIGS. 11 and 12, a conductive layer 32 is formed over the ~~excited~~ exciting light absorbing layer 34. The conductive layer 32 has conductive and light-transmitting properties and is made from, for example, indium oxide, zinc oxide or tin oxide, or a mixture comprising at least one thereof. The ~~excited~~ exciting light absorbing layer 34 absorbs the phosphor exciting light to produce the electron-hole pairs. Although a part of the pairs remains in a state of no recombination, charges caused by the electron-hole pairs are discharged by the conductive layer 32 since the conductive layer 32 is contact with the ~~excited~~ exciting light absorbing layer 34. Accordingly, the electrons and holes are never continuously

stored in the ~~excited~~ exciting light absorbing layer 34 and the protective insulated layer 31. Therefore, there is almost no influence to the electric field formed by a voltage to be impressed to the top gate electrode 30.

Please amend the paragraph at page 57, lines 7 to 15 as follows:

Following ~~to~~ that step, an ~~excited~~ exciting light absorbing layer 34 is formed in a film state throughout on the protective insulated layer 31. Then, a conductive layer 32 is formed in a film state throughout on the ~~excited~~ exciting light absorbing layer 34. Further, the conductive layer 32 is chemically-processed to form an overcoat layer 33, which is made from, for example, polycation (such as poly-L-lysine and poly(ethylene imine) or a silane coupler, in a film state on the conductive layer 32.

Please amend the paragraph at page 59, line 15 to page 61, line 15 as follows:

Then, the light source is turned on, and the phosphor exciting light is irradiated from the light-guiding plate 73 to throughout on the surface of the optical DNA sensor 1, and the DNA reading apparatus 70 starts to read in

response to the irradiation of phosphor exciting light. Following to the irradiation, fluorescence is emitted from the fluorescent substance bound to the sample DNA segments in the spots 60 of the set of the DNA probe 61 and the sample DNA segments having bonded with the DNA probe 61, but no fluorescence is emitted in the spots 60 of the DNA probe that did not bind to the sample DNA segments. Fluorescence emitted from the spots 60 containing the DNA probe bonded with the sample DNA segments transmits the overcoat layer 33, the conductive layer 32, the ~~excited~~ exciting light absorbing layer 34, the protective insulated layer 31, the top gate electrode 30, an interlayer insulated film 20 and the channel protective film 24 and is incident to the semiconductor layer 23 of the sensor 20 corresponding to the spots that have emitted the fluorescence. At that time, a part of the phosphor exciting light is not converted to fluorescence and is incident to the ~~excited~~ exciting light absorbing layer 34 underneath the spot 60 in which the hybridization occurred. However, since the wavelength range of such a phosphor exciting light is short, it is absorbed into the ~~excited~~ exciting light absorbing layer 34 and almost no phosphor exciting light reaches to the semiconductor layer 23. On the other hand, fluorescence is not incident to the semiconductor

layer 23 of the sensor 20 that corresponds to the spot 60 comprising the DNA probe having not bonded with the sample DNA segments. As a result, the phosphor exciting light is incident to the ~~excited~~ exciting light absorbing layer 34. However, since the phosphor exciting light is absorbed into the ~~excited~~ exciting light absorbing layer 34, it does not reach to the semiconductor layer 23. Hence, the phosphor exciting light does not reach the semiconductor layers 23 of all sensors 20 irrespective of occurrence of the hybridization. Because of that, there is no case that the semiconductor layers 23 are excited when the phosphor exciting light emitted from the light source 72 is directly incident to the semiconductor layers 23, and that the electron-hole pairs in a quantity of causing sufficient drain current flow is produced in the semiconductor layers 23. Accordingly, substantially no holes are accumulated in the semiconductor layer 23 of the sensor 20 that corresponds to the spot 60 comprising the DNA probe 61 having not bonded with the sample DNA segments, and a large quantity of holes are accumulated in the semiconductor layer 23 of the sensor 20 that corresponds to the spot 60 comprising the DNA probe having bonded with the sample DNA segments.

Please amend the paragraph at page 61, lines 22 to page 62, line 18 as follows:

As described above, in this embodiment, since the phosphor exciting light is absorbed and shaded by the ~~excited~~ exciting light absorbing layer 34, substantially no phosphor exciting light is incident to the semiconductor layer 23. However, the fluorescence is not shaded and is incident to the semiconductor layer 23. As a result, only the semiconductor layer 23 of the sensor 20 that corresponds to the spot 60 having bonded with sample DNA segment produces the electron-hole pairs. Therefore, difference between the light intensity sensed by the sensor 20 that corresponds to the spot 60 having bonded with the sample DNA segment and the light intensity sensed by the sensor 20 that corresponds to the spot 60 being not bonded with the sample DNA segment becomes greater. As a result, contrast in images that represent the fluorescence intensity distribution is improved, the production of the electron-hole pairs as noise is inhibited even though the intensity of the phosphor exciting light is increased, and determination of nucleotide sequences in the sample DNA segments can be facilitated.

Please amend the paragraph at page 62, line 19, to page 63, line 4, as follows:

Note that, although the ~~excited~~ exciting light absorbing layer 34 is laminated on the protective insulated layer 31 in the above description, the absorbing layer 34 may be laminated between the top gate insulated film 29 and the top gate electrode 30, or between the top gate electrode 30 and the protective insulated layer 31, or between the conductive layer 32 and the overcoat layer 33. Namely, the ~~excited~~ exciting light absorbing layer 34 may be laminated in between any layers, as far as it is formed on the surface of the solid imaging device 2 and in a range between the semiconductor layer 23 and the spot 60.

Please amend the paragraph at page 64, lines 13 to 18 as follows:

Irrespective of using the CCD image sensor or CMOS image sensor, ultraviolet rays will not be incident to the photodiodes, if the ~~excited~~ exciting light absorbing layer 34 is laminated between the spot and the photodiode and the photodiode is coated with the ~~excited~~ exciting light absorbing layer 34.

Please amend the paragraph at page 64, line 22, to page 65, line 12 as follows:

The difference of this embodiment from the optical DNA sensor according to the third embodiment exists in either the conductive layer 32 or the top gate electrode 30 of the optical DNA sensor 1. Also, in the fourth embodiment, an ~~excited~~ exciting light absorbing layer 34 may be or may not be provided to the optical DNA sensor according to the fourth embodiment. Other constituents of the optical DNA sensor according to the fourth embodiment are same as those constituents of the optical DNA sensor 1 according to the third embodiment. With reference to FIGS. 1 to 12, the distinctive features of the optical DNA sensor of the fourth embodiment is explained in detail with use of the same reference numerals for the same constituents.

Please amend the paragraph at page 65, line 13-20 as follows:

Namely, unlike the third embodiment wherein the ~~excited~~ exciting light absorbing layer 34 absorbs the phosphor exciting light to shade it and has fluorescence-transmitting property, in the optical DNA sensor according to the fourth embodiment, at least one of the conductive layer 32 and top

gate electrode 30 absorbs the phosphor exciting light to shade it and has fluorescence-transmitting property.

Please amend the paragraph at page 67, lines 4 to 23 as follows:

As described above, the absorption edge of ITO of at least one of the conductive layer 32 and the top gate electrode 30 has been shifted to a greater energy side as the charge density increases. Therefore, by lessening the charge density, it enables ITO to absorb light of shorter wavelengths. In FIG. 13C, a relation of the thickness of the ~~excited~~ exciting light absorbing layer 34 to the phosphor exciting light with a wavelength of 308 nm and the transmittance of fluorescence with a wavelength of 530 nm when the charge density of ITO of the conductive layer 32 or the top gate electrode 30 in the optical DNA sensor 1 with the configuration described in the third embodiment is set to 1.0×10^{19} [$1/cm^3$] and the optical constant N of ITO is set to N(308nm)= 2.2 - 0.34i (wherein i is an imaginary unit). In comparison with FIG. 13B, where the charge densities of both conductive layer 32 and top gate electrode 30 exceed 1.0 x 1019 [1/cm3], it is noted that the phosphor exciting light with a wavelength of 308 nm is further shaded in the conductive layer 32 or the top gate electrode 30.

Please amend the paragraph at page 70, lines 4 to 11 as follows:

~~Unlike that~~ Instead of the ~~excited~~ exciting light absorbing layer 34 ~~is~~ laminated between layers in the area extending from the semiconductor layer 23 to the spot 60 in the optical DNA sensor 1 according to the third embodiment, a dielectric multilayered film 35 is laminated between layers in the area extending from the semiconductor layer 23 to the spot 60 in the optical DNA sensor according to the fifth embodiment.

Please amend the paragraph at page 76, lines 4 to 10 as follows:

Note that the optical DNA sensors according to the fourth and fifth embodiments can be used for the DNA reading apparatus according to the sixth embodiment. In any case, it is needless to form the ~~excited~~ exciting light absorbing layer 34, to reduce the charge density of the conductive layer 32 to a level of 1.0×10^{20} [$1/cm^3$] or less, and to laminate the dielectric multilayered film 35.

Please amend the paragraph at page 77, lines 4 to 19 as follows:

~~Unlike that~~ Instead of layers for shading the phosphor exciting light [[,]] (that is, the ~~excited~~ exciting light absorbing layer 34 and the dielectric multilayered film 35) ~~, are~~ formed in an area extending from the semiconductor layer 23 to the spot 60 in the third and fifth embodiments, such layers for shading the phosphor exciting light are not formed in the optical DNA sensor according to the seventh embodiment, but the conductive layer 32 is formed directly on the protective insulated layer 31, as shown in FIG. 18. This conductive layer 32 has a charge density exceeding 1.0×10^{20} [$1/cm^3$] and is configured not to shade the phosphor exciting light, unlike the conductive layer described in the fourth embodiment. The other constituents of the optical DNA sensor according to the seventh embodiment are similar to those of the optical DNA sensor described in the third embodiment.

Please amend the paragraph at page 81, lines 7 to 16 as follows:

Further, although the light irradiation means of the DNA reading apparatus 70 irradiates ultraviolet rays

emitted in a state like a plane of light from the adjacent position as the ~~excited~~ exciting light in each of the above-described embodiments, this ~~excited~~ exciting light may be replaced with the evanescent light that is incident from a prefixed direction. In this case, since ultraviolet rays decline before reaching the semiconductor layer 23, even a semiconductor layer that is susceptible to excitation by ultraviolet rays may be used.

And please amend the paragraph at page 81, line 23, to page 82, line 7, as follows:

Still further, the light irradiation means of the DNA reading apparatus 70 occasionally irradiates ~~excited~~ exciting light against the surface of the optical DNA sensor in each of the above-described embodiments, the ~~excited~~ exciting light may be irradiated from the reverse surface of the optical DNA sensor 1 against the reverse surface. In this case, since the bottom gate electrode 21 has shading property, the ~~excited~~ exciting light never be directly incident to the semiconductor layer 23.